

Review of “Investigating the interaction of waves and river discharge during compound flooding at Breede Estuary, South Africa” by Kupfer et al.

The paper investigates the interaction between tide, discharge and waves with a focus on waves to analyse compound flooding in the Breede Estuary. The study is based on a scenario analysis using the numerical Delft3D model. The paper highlights the importance of waves for compound flooding for South African open estuaries based on the scenarios used. The paper is well written and explains the results in a concise way. However, the study leans heavily on the selection of scenarios which comes with some limitations which should be better addressed in the discussion and some choices that should be better justified in the methods section. I therefore recommend the publication after major revisions.

General comments

The selection is rather limited and conservative based on the combination of 100-year return values of Q and waves without any analysis of the dependence between Q and waves. While I appreciate that adding a statistical analysis would change the focus of the paper and modelling many more combinations of flood drivers with different return periods will dramatically increase the computational effort, it would provide a more comprehensive analysis of the importance of waves for compound flood risk. At least some discussion on choice of scenarios on the results should be included.

It is also unclear what the relative timing between the Q, waves and tides peaks is and how this is selected and what the effect of the time lag on the results is. If no observed data is available for a time lag analysis a sensitivity analysis would strongly improve the robustness of the findings.

Specific comments

L185: A table for the validation events would be helpful to a reader.

L226: It is unclear how the return value for Q is translated into an event hydrograph which is required to force the model.

L227: It is unclear why the maximum Q peak value was corrected. Also provide more details about how the 100-year event was derived from the time series.

L229: Can you justify the choice of a 3 m³/s Q event for the S_{TW} scenario?

L244: It is not clear how the two columns in Table 3 relate to the four events shown in Figure 3. It would be useful to include all events separately in table 2 or use the same naming or numbering for the events in both. A table of all validation events as mentioned earlier would also help.

L296: It is not clear what you mean with “similarly higher”. In Figure 4 it seems to me that the difference between S_{TW} and S_{TWQ} decreases outside the estuary.

L335: A simple time series plot of WLs at one or more locations would be easier and more appropriate and informative instead of the right panel of Fig 6.

L377: Should “flooding” not be “flood drivers” in this sentence?